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NOTES ON SOME OBSCURE CASES

OF

With kind regards

POISONING BY LEAD CHROMATE,

MANIFESTED CHIEFLY BY ENCEPHALOPATHY.

presented by the author

BY

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THE HOSPITAL OF THE JEFFERSON MEDICAL COLLEGE.

FROM

THE MEDICAL NEWS,

June 18, 1887.





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I DESIRE to bring to the notice of the profession some cases of saturninism that recently came under my observation which are peculiarly interesting on account of the mode of entrance of the poison as well as of the somewhat unusual symptoms presented.

In a family of nine persons, all of whom had been in sound health up to January 1, 1887, and in whom no hereditary predisposition to affections of the nervous system was known to exist, six had, in a period of four months, eclampsia, which I am inclined to believe was in all of saturnine origin, or at least had a saturnine element in its causation. Four of this number succumbed to the eclampsia, two made good recoveries. The two cases that recovered and two of those that terminated fatally came under my immediate observation.

Beside these six cases, two other members of the same family presented symptoms which were of the nature of lead encephalopathy, although eclamptic attacks were absent. Of the two fatal cases under my care, in one there can be only the shadow of a

doubt that the eclampsia was due to lead; in the other, the exclusion of other affections, the character of the symptoms, the presence of a blue line along the gums leave no room for question as to the nature of the case. The discovery that all had, for a continuous period from the above-named date, probably daily, ingested more or less lead, and in a highly toxic form, contributes greatly to the support of my assumption as to the probable nature of the other cases.

In presenting concise histories of these cases, I purposely refrain from enlarging upon points connected with the manifestations of the eclamptic attacks, and the treatment pursued not necessary to the establishing of a diagnosis, believing that a prolonged history, however interesting, would render the sketch too discursive, and contribute but little to its value in directing the attention of the profession to the possible greater frequency of saturnine encephalopathy in our midst than we are aware. It is likewise hoped that it will aid, at least in a slight way, toward bringing about some stringent action on the part of the authorities, making the use of lead chromate as an adulterant of food articles a misdemeanor punishable by the severest penalties.

CASE I.—Mary D., æt. five and one-quarter years, had never been ill until December last, when she contracted a mild attack of pertussis. There had been a slight whoop in her cough for two or three weeks before death, but the spasmodic element was said to have been so slight that the parents were in doubt whether the affection deserved the name of whooping-cough; the accessions were few in number and the cough of very moderate severity. She had been about from the first and partook of her meals with the family. For two or three days prior to the onset of the eclampsia, she had complained of anorexia and nausea and had frequently

vomited. The vomited matter was said to have consisted of a greenish-yellow fluid. It was thought the fits of vomiting were not particularly provoked by cough. The symptoms were thought to indicate a digestive disorder by the parents, and medical aid was not sought. She was seized with a violent, general convulsion on January 8th, and died on the following morning, eight hours after the first seizure, having had in the neighborhood of thirty-five convulsions. On account of not having seen the case twenty-four hours prior to death, the physician who was called reported it to the coroner. No post-mortem examination was made.

CASE II.—Louisa D., æt. three and one-quarter years, had never been ill until a slight attack of pertussis appeared early in January. There had been a slight whoop in her cough since January 10th, but the cough was not thought by the parents sufficiently troublesome to require treatment. She was constantly about the house, and was permitted to eat of whatever food was upon the table. She complained of not feeling well on January 23d, and had several attacks of vomiting. She was about on the 24th, but vomited during the day, not particularly, however, after a paroxysm of cough. The vomited matter was said to consist of a greenish-yellow fluid, biliary in character, similar to that ejected by Case I. On the afternoon of January 24th, shortly subsequent to an exacerbation of cough, she complained of nausea and asked for a basin that she might vomit. During the act of vomiting convulsions appeared, which, I am informed, continued, with brief intervals of stupor, until death occurred within twelve hours after the first seizure. Her bowels were said to have been open on that day, and there was thought to have been neither constipation nor diarrhœa.

I did not attend either of the preceding cases, but believe the clinical histories as given to be entirely reliable. I have been informed, since my attention was directed to lead as the possible cause of these deaths, that both of the preceding cases complained

occasionally, for a few days anterior to the attacks, of pains in the abdomen, but I could not discover if they were of a colicky nature.

CASE III.—Wm. D., æt. fifteen months, also had pertussis when convulsions appeared. The first spasm occurred on the day Case II. died, January 25th. The whoop had appeared in the cough ten days before. The attack of pertussis was of average severity, and the number of accessions moderate. His cough was loose and attended by profuse secretion, most of which was swallowed when coughed into the pharynx. There was not a great deal of vomiting. He had been allowed for several months to partake of ordinary "table food," but he was not known to have eaten at that time anything particularly indigestible and his bowels had been open twice on the preceding day. The first convulsion lasted fifteen minutes and was very severe; it was succeeded by stupor in which I first saw him. The temperature was but slightly elevated; the head not very hot; anterior fontanelle moderately tense; gums nowhere sufficiently swollen to account for the spasms; the tongue was furred. There were a few moist râles in the chest but unaccompanied by any alteration in resonance. The urine was free from albumen. Five severe convulsions occurred on the following day, each being succeeded by insensibility lasting an hour or more. On the next day there was but one, which, however, was exceedingly severe and continued for nearly two hours, during which there were constant tonic and clonic spasms, general and local. On January 28th there was a mild one, after which no more occurred until February 3d, when he had a severe one, which terminated the eclamptic attacks, and he then made a rapid recovery from both eclampsia and pertussis.

On the day preceding the last convulsion, February 2d, the gums covering the lower canines seemed to be rather tense; they were freely incised at the time of the last convulsion. There was only a moderate amount of bronchial catarrh accompanying the pertussis and no inflammatory complications occurred. The convul-

sions did not occur during or immediately succeeding paroxysms of cough.

CASE IV.—Lewis D., æt. seven and a half years, had an eclamptic attack for the first time on March 18th. He had had an attack of pertussis in December, 1886, from which he made a good recovery. No complications were supposed to have occurred during it, and there had been no whoop in his cough for two months. He was supposed to have coughed rarely, if at all, for several weeks preceding the above date. His health had always been most excellent, and he was of a strong though nervous constitution. It was remarked that, for a day or two preceding the outbreak of the eclampsia, his breath had been offensive and his tongue furred. The bowels had been inclined toward constipation for several weeks before this time. On the evening of March 17th, after having fallen asleep on a chair, before retiring, on awaking his face wore a startled expression accompanied by some oscillation of the eyes. No complaint was made of headache or pains elsewhere, as far as could be remembered. I gleaned from an outsider that he had had a fall, while at play in the street, a day or so before. His parents were not aware of it, as he had uttered no complaint.

At noon on March 18th, without known premonitory symptoms, while playing with a sister, he suddenly fell to the floor in a general tonic convulsion, which rapidly gave place to a severe general clonic one, lasting upward of a half hour, leaving him in a stupor from which, in a few minutes, he emerged to be again seized with tonic and clonic spasms. He continued in this state, almost constantly convulsed, with short intervals of remission in which great restlessness, stupor, or coma was present until 4 o'clock on the following afternoon, when death ensued, about twenty-eight hours after the first seizure.

Œdema of the lungs, bronchi, and trachea occurred in the preceding evening, and from this time on, at short intervals, frothy mucus, sometimes blood-streaked from the bitten tongue, appeared at the mouth and nose. The respirations changed from stertor to well-

marked Cheyne-Stokes two hours before death, and so continued until dissolution. His temperature, which a few hours after the onset had been only slightly above normal, rose to 107° F. before death.

I did not see him until some hours after the first seizure, and could then get no further information as to the origin of the attacks than has been given. The physical examination revealed very little. The heart was normal; moist râles were present in the chest, due, I thought, to a beginning œdema; and there was some alteration in the resonance at the bases posteriorly, but it was difficult to determine satisfactorily to what this was due. An examination of the urine showed neither albumen nor sugar. He had had no symptoms indicating the onset of any of the acute diseases which are, in children, frequently accompanied by sympathetic convulsions,

The result of the necropsy, briefly stated, was as follows: Externally, on the forehead of the right side, in the upper part of the middle frontal region, there was a small ecchymosis, and the external periosteum beneath was the seat of a very small punctiform extravasation. There was no bruise in the internal periosteum. The brain weighed fifty-six ounces avoirdupois; was healthy and rather anæmic. There was a very small quantity of fluid contained in the lateral ventricles. The pericardium and heart were normal. An old adhesion existed in the left pleura, at the apex of the lung. The lungs were congested, œdematous, and, posteriorly, part of the lowest and middle lobes on the right, together with a small part of the lower lobe on the left, in the same situation, were apparently the seat of a bronchopneumonitis, which had been altogether "latent" during life. This condition was only evident posteriorly in small portions of the lobes. Dr. Rively, Demonstrator of Histology in the Jefferson Medical College, very kindly made sections of these portions for microscopic examination, and assured me they were the seat of a pneumonia. In the abdomen the organs were all apparently in a healthy condition. A thorough examina-

tion was not made here, it being the wish of the parents that as little as possible should be disturbed.

CASE V.—Mrs. V., æt. thirty-seven, mother of seven children. At the date her eclamptic attack occurred she was at the end of the eighth month of gestation. She had always been healthy, but had noticed during the past three or four pregnancies some œdema of both legs; not sufficient, however, to affect her general health, or interfere with locomotion. She had never had a convulsion, puerperal or otherwise, until April 24th of this year. For the space of a week or two previous to this date she had suffered with supraorbital neuralgia and slight pains and anæsthesia in the inferior extremities. Her bowels were inclined toward constipation, but she thought she had a free passage four times a week. Her urine was normal as to the quantity passed, but there was a small amount of albumen present, estimated by the method of Hoffman and Ultzmann to be one-sixth per cent. The quantity of her urine underwent no diminution prior or subsequent to the attack, and by the specific gravity alone it was thought the nitrogenous elements were being excreted in fair amounts. No examination for casts was made.

On the morning of April 24th, while occupied with her household duties, feeling quite well and entirely free from any cloudiness of mind, headache, disorders of vision, or vertiginous sensations, she was suddenly seized with a severe epileptiform convulsion, lasting ten minutes. After an hour's interval, during the greater part of which she lay in a semi-unconscious state, and had an attack of vomiting, the matter vomited containing a great deal of bile, a second convulsion occurred, which continued, with very slight intermissions, a half hour, followed by an attack of acute mania lasting three hours. The tongue was severely bitten during the convulsions. Very prompt treatment brought her about, and the convulsions were not repeated. As they were believed to be of puerperal origin, and closely related to the albuminuria, she was put upon an absolutely milk diet, appropriate remedies

were prescribed for her condition, and complete rest in the recumbent posture was enjoined.

CASE VI.—Amelia D., æt. twelve years, was well-made physically; her temperament was a combination of the lymphatic and nervous, and she was considered a bright and promising child. Her health had always been remarkably good prior to the beginning of the present year. Since then it was noticed she had fallen off in flesh and color, but this was attributed by her parents to her grief on account of the loss of her brother and sisters, as she made no complaints of feeling ill. For several days preceding the eclamptic attacks, she seemed listless and unable to exert herself; spoke of having headache and “feeling bad all over.” There was complete anorexia and a very fetid breath. The day before the onset of the convulsions she suffered with nausea, accompanied by vomiting of a greenish fluid resembling bile, and a racking headache, located in the frontal and occipital regions.

I was called to see her for the first time on May 12th. Her temperature was 99° F., pulse 130; the tongue was heavily furred, particularly the posterior portion, while along the left lateral edge, on a line between the dorsum and under surface, the fusiform papillæ were prominent and of a deep black color. There was no cough, and the lungs and heart were normal. No abdominal tenderness was present, and no pain on pressure about the head, neck, or spine, and there was no retraction of the neck or spots on the skin. An examination of the urine revealed nothing. In the evening the headache had greatly increased in severity, great restlessness had developed, and two severe general convulsions occurred. These were apparently checked by the treatment begun, and she passed a moderately comfortable night. The headache, however, became again more severe toward morning and continued so through the day; the tongue remained coated and the breath offensive, notwithstanding she had been well purged on the preceding day. At five o'clock in the afternoon the convulsions recurred and continued from that time on, with slight intermissions, during which there was rest-

lessness, stupor, or coma, until four o'clock on the following afternoon, when death occurred—about forty-two hours after the first seizure. (Edema of the lungs, bronchi, and trachea developed some hours preceding the fatal issue, and well-marked Cheyne-Stokes breathing appeared. Her temperature during the convulsions was never found to rise to a greater height than $102\frac{1}{2}^{\circ}$ F. The restlessness during a few hours preceding death was intense. The convulsions continued up to death, but were confined, toward the end, to the upper extremities and facial muscles.

A necropsy was made shortly after death, for the purpose of removing the viscera that a chemical examination might be made of them for the presence of lead. The body was well nourished and well developed for a girl of twelve years. There was a distinct blue line below the lower central and lateral incisors at their junction with the gum. The stomach and contents, part of the liver, the large and small bowel, the spleen, and a kidney were removed and placed in Dr. Leffmann's hands for chemical examination. The abdominal organs appeared to be in a healthy condition. The thorax, on account of the wishes of the parents, was undisturbed. Dr. Longstreth very kindly made an examination of the brain, and informed me that the fibrous tissue about the base, particularly in the neighborhood of the straight sinus, was thickened; the lateral and fifth ventricles were somewhat dilated and contained more than the average quantity of fluid. Microscopically, many of the arterioles showed irregular dilatations. In the cerebellum the corpus dentatum was exceedingly ill-defined, and in small parts seemed thickened. The brain and meninges were congested, and there was an ante-mortem clot in the longitudinal sinus. The brain weighed fifty-three and three-quarters ounces, avoirdupois.

The sudden illness of this child in whom there had existed no previous disease, in so short a time after the eclamptic seizures in the others, and with some points of similarity in the symptoms preceding

the onset of the eclamptic attack, caused me to look carefully for something apart from a mere neurotic element as the cause, underlying the supposed digestive disorder, which could give rise to the eclampsia. I felt a doubt if any of the convulsive seizures in these cases had been directly excited by the affections under which they were known to have been laboring. The symptoms presented by Case VII., who was now brought to me, assisted materially in throwing light upon all the preceding cases.

CASE VII.—Kate D., æt. thirteen and three-quarter years, was noticed to have failed in health and strength for several months past; her skin had, from a rosy tint, become of rather an earthy hue; her appetite had failed, and she suffered with frequent headache and slight pains in the legs, back, and abdomen, with occasional attacks of nausea and vomiting.

No particular notice was taken of her condition, her parents supposing that grief because of the loss of her playmates, together with the fact that she was approaching puberty, would account for her condition. About the time Case VI. was taken ill she grew rapidly worse and was brought to me for examination. She was then very anæmic, the conjunctivæ and gums were very pale. Her skin had not the hue of chlorosis, it was rather of an earthy-yellow color. Her heart was over-acting, with a markedly accentuated second sound at the apex. The temperature was 99° F. She suffered with constant severe headache, which she located in the temples and occiput; there was pain in the posterior part of the neck as well. There were no painful points. The back of the neck was tender on pressure, but no cutaneous hyperæsthesia or retraction of the neck existed. She had slight photophobia, and the pupils were irregular. Slight pains in the knees and ankles were also present, without swelling or tenderness on pressure. There were occasional colicky pains about the umbilicus, but of no severity. Her bowels, which previous to her falling off in health had been

quite regular, now became constipated. She had irregularly, though about once daily, attacks of nausea, and vomited a good deal of bile. The night previous to the day I saw her she had been quite delirious and continued so, with lucid intervals, into the day. During this attack of mental wandering she complained of numbness in the upper and lower extremities, passed a large quantity of limpid urine, and vomited freely, the vomited matter being bilious in character. Lead poisoning being suspected, the gums were examined carefully for a blue line. A moderately well-marked one was noticed at the junction of the left lower canine and the adjoining first bicuspid and the gum. Her urine was free from albumen.

CASE VIII.—Edward D., *æt.* nine years, who up to this time had exhibited no symptoms of illness, now began to ail in much the same manner as Case VII. He was seized with severe headache and some pains in the knees and ankles. He had slight colicky pains in the belly associated with vomiting; the vomited matter consisted of a greenish-yellow fluid resembling that ejected by the others. His bowels were inclined toward constipation. He was anæmic and there was fine tremor in both hands and twitching in the muscles about the mouth on protruding the tongue and in speaking. The tongue was thrust out tremulously and was quite heavily furred. There was a suspicion of a blue line along the gum in the neighborhood of one of the lower incisor teeth. His urine contained no albumen.

Seven of these cases exhibited several similar and notable symptoms in common, though in a varying degree. All the eclamptic cases, save Case III., had preceding symptoms referable to the stomach or bowels, and vomiting of a greenish fluid resembling bile¹ was present in seven out of the eight cases. In

¹ Tanquerel laid stress on the great frequency of nausea and vomiting as accompaniments of colic seated about the epigastrium, due to lead. He also stated that vomiting most frequently exists at the commencement of lead colic, as soon as the pains are felt, and that the matter vomited has a greenish hue.

Case VI. the gastric symptoms were very marked, and it was not until Case VII. was taken ill that it was mentioned to me as having occurred in some of these cases, by the parents, who fancied the bilious vomiting and slight colicky pains present in Cases I. and II. to have been a simple gastric disorder unworthy of remark.

Convulsions occur in pertussis with a moderate degree of frequency, and from such a variety of causes that it would be difficult to assert that none of them were in operation in the first three cases of my series. They are, however, very rare in uncomplicated cases, unless the child is of very tender age, or the attack severe, with the spasmodic element marked, and the accessions frequent. In the latter case deficient aëration of the blood or, in highly sensitive children, an exaggeration of the nervous excitement which is an ordinary symptom of the disease, is the probable cause.¹ Convulsions in pertussis may, too, be due only indirectly to that disease.²

In early childhood a tendency to eclamptic attacks, which is more or less common, is aggravated by the state of nervous tension in which the system is maintained by the pertussis, so that often very slight gastric or intestinal irritation, or an attack of dentition, will provoke a seizure. But convulsions from such a cause are rarely followed by serious consequences, and are readily checked. A frequent cause of eclampsia in pertussis is the presence of an inflammatory affection of the lung, such as bronchitis of the smaller tubes, or broncho-pneumonia. In twelve cases of eclampsia in pertussis, observed by Meigs and Pepper,³ all of which occurred under

¹ Eustace Smith : A Practical Treatise on Diseases in Children.

² Ibid.

³ Diseases of Children.

the age of three years, six had severe bronchitis preceding the eclampsia, and one a pneumonia. Five of the twelve died; of these five, four were bronchitic cases.

I have previously remarked in the recital of the histories as to the mild character of the whooping-cough in the first three cases, none of them having had a lung complication, and Cases I. and II. were beyond the age at which any of Meigs' and Pepper's cases occurred. As all were of a nervous organization and presented symptoms of gastric disorder, the eclampsia might be attributed to the latter as a complication if the attacks had not been so severe, frequent, long-continued, and, in two, ending in death. But as the digestive trouble was probably produced by the cakes containing the chromate of lead, of which all the cases, even the baby, ate freely, and as this salt acts as an irritant poison,¹ even in small quantities setting up gastric trouble, I may be permitted to say that lead probably was the source of the trouble, even if the eclampsia were not what is technically called saturnine—that is, due to the direct action of the metal on the nervous system. But, in Cases II. and III., colicky pains, nausea, and vomiting of a greenish-hued fluid, would rather indicate the systemic action of this substance.

The latent broncho-pneumonitis found *post-mortem* in Case IV., in a boy aged seven and a half, with a brain weighing fifty-six ounces, seemed at that time sufficient to account for the eclamptic attacks, though I thought scarcely sufficient to account for their continuance and mode of termination. Looking at the case now, in the light of later developments, it would

¹ Taylor on Poisons.

seem reasonable to suppose that since the slight broncho-pneumonitis present was probably secondary to a lobular collapse, occurring at the period of his attack of pertussis in December last, it is unlikely that, having escaped eclampsia then, at a period most favorable to its development in one predisposed, he should have succumbed to it now. It is difficult to decide what influence the fall of a day or two before had upon the development of the eclampsia. As he made no complaint of his head and presented no symptoms of cerebral irritation, it is fair to conclude the trouble did not arise from it. The knowledge of the ingestion of lead, the colicky pains in the abdomen, with the fetid breath and constipation, point strongly to that mineral as the agent at work.

It is more difficult to form an idea as to the influence of lead in the production of the eclampsia in Case V., occurring as it did toward the end of pregnancy, with albuminous urine and œdema of the legs. There was, however, no diminution from the normal quantity of urine excreted preceding the onset of the eclampsia, and though no examinations were made to determine the quantity of urea excreted, it was thought from the specific gravity of that passed, that the kidneys were doing their work fairly well. The amount of albumen was at no time large. Lusk¹ calls attention to the fact that it is the renal insufficiency causing the retention in the blood of the excrementitious matters, and not the mere presence of albumen which gives rise to uræmia and convulsions. Although this woman had œdema of the legs and, probably, albuminuria in former pregnancies, no convulsions had occurred. She presented

¹ Science and Art of Midwifery.

no symptoms of uræmia at the time of the attack. The headache and slight loss of sensation in the legs complained of, unaccompanied by such symptoms as drowsiness, vertigo, disorders of vision, were scarcely of this nature. The fact that she had been consuming more or less lead in no small quantities for several months, and that the convulsions occurred at a time when others were likewise affected, after having been exposed to the same agent, favors the assumption that the eclampsia was of saturnine rather than renal origin.

When searching for evidences of lead poisoning in the others, her gums were examined, and it was noticed that the upper part of the gum near the teeth in the neighborhood of the lower central and lateral incisors, was very distinctly blue. The removal of the cause in the cases surviving, and proper remedies directed against the lead in the system, soon produced a marked improvement in all.

Case VII.'s headache, colicky pains in the abdomen, anorexia, nausea, vomiting, and pains in the legs, all disappeared, and she is rapidly regaining her strength and color. She complains yet of a persistent pain in the right hip-joint, which does not cause any serious annoyance.

Case VIII. made a still more rapid improvement, not having been so much affected as his sister.

In searching for the origin of the trouble, it was learned that the family had occupied the dwelling they were then in for the past five years, and that no case of illness of any sort had occurred during that time, until about the beginning of the present year. I made a careful examination of the house, its contents, and the plumbing, but was unable to discover anything to cause suspicion, save, perhaps, an iron kettle, glazed on its interior, which had

been in use for several months. Knowing that litharge was formerly used in making glazed earthenware and iron vessels, and that accidental cases of poisoning have occurred from the use of such utensils in cooking acid fruits and vegetables,¹ I had some of the glaze removed for a chemical examination. Scarcely supposing the lead could have come from this, as they had eaten very few acid fruits and vegetables during the winter and spring, I thought it probably came from a source external to the house.

Learning from the family that they had made a change in their baker a short time preceding the date their illness began, and learning, accidentally, that the baker, who had been in the neighborhood scarcely a year, had himself lost a number of his family in convulsions a year or so previous, I visited him for the purpose of making inquiries. I found his wife suffering with pains in her ankles and stomach, which had been worrying her intermittently for some months, and which she attributed to overwork. A brief examination disclosed the fact that she was intensely poisoned by lead. Her bowels were constipated, she had dry colic, a metallic taste in her mouth, loss of appetite, occasional attacks of nausea and vomiting, headache, and arthritic pains in the limbs, her tongue was coated, the breath fetid, and the gums in the upper and lower jaws were of a deep blue color.

I at once informed the baker of her trouble. He assured me he was unable to enlighten me as to its source, as he had no lead about his establishment. He denied using any artificial coloring agent in his trade. A visit to his cellar, however, into which I had him take me, disproved his assertion, for after

¹ Woodman and Tidy: Forensic Medicine and Toxicology.

making an inspection of his plumbing and the bake-oven, and procuring some samples of his flour and chemicals used for raising dough, he permitted me, after some demurring, to see a pitcher, which contained a quantity of yellowish substance, partly in solution, which I recognized as chrome yellow.

Further inquiry elicited from him the information that he used it solely to give color to his tea- and cinnamon-buns, employing about a tablespoonful of the powder and water to a forty pound mass of dough. He assured me he was unaware of its poisonous nature, and did not introduce it into his more expensive cakes, using eggs for them. I took a sample of this substance to Dr. Leffmann for examination; he at once pronounced it chromate of lead.

I further learned from the baker that he had lost, between May, 1884, and January, 1886, a wife and six children in convulsions, and that lead poisoning was suspected to be the cause of death in most of the cases. During this time a journeyman baker in his employ also was seized with lead colic, and was forced to leave him.

On making inquiry of one of the physicians who had attended this family at the time some of the deaths took place, I learned that these cases had caused a great deal of talk when they occurred, as the circumstances surrounding the deaths were so peculiar. They seemed to be all cases of saturnine eclampsia, but the source whence the lead was derived had not been discovered. It now seems most likely that it was the chrome yellow used by the baker to color his cakes.

I ascertained from Mr. D. that his family, since dealing with this baker, had been in the habit of purchasing daily from twelve to eighteen of the tea and

cinnamon-buns from the baker and, usually, double this quantity on Sunday. He stated that they were greatly liked on account of their yellow color and good taste by all in the house but himself, who had no liking for sweet cakes, and that it was a rare thing for any of them, scarcely excepting the baby, to partake of anything at breakfast save these buns, and coffee or milk.

The use of chrome yellow as a coloring agent by bakers is not recent. In the *Medical Times and Gazette* of December 24, 1859, p. 635, are recounted six cases of acute poisoning caused by eating Bath buns, colored by this agent. Some of the buns which had not been consumed were subjected to analysis, and it was found that each contained seven grains of chromate of lead. Marshall, of the University of Pennsylvania, has recently¹ published the result of some work he has done in this direction. He found lead in the buns and pound-cake of four out of twenty-six shops. Dr. Leffmann made for me analyses of some bright-yellow sponge-cake and tea-buns obtained from the baker I found using the chrome yellow. The result is subjoined. He suggests that while the naphthol yellow, which he is inclined to believe is the agent used to impart color to the sponge, may in itself be harmless, it is possible that it may, from its chemical nature, promote somewhat the absorption of the lead chromate when these agents come together in the stomach.

The only cases hitherto on record of death by chrome yellow are those reported² by Dr. von Linstow, of Ratzeburg, who described the cases of two children under four years of age. They ate some substances

¹ MEDICAL NEWS, January 1, 1887.

² Taylor on Poisons.

made to look like bees, consisting of gum tragacanth, colored with this agent. They were seized, in two or three hours, with violent vomiting, great thirst, restlessness, and prostration. The matter at first vomited had a yellowish color. There was no diarrhoea, or complaint of pain. On the following day the younger had slight purging, with convulsions, and died on the second day. The other was listless, almost unconscious, with irregular pulse, great thirst, and dysphagia. He died on the fifth day.

It is stated by Wormley¹ that the amount of chrome yellow taken by each of these children did not exceed the one-fifth of a grain. That seems barely possible, as it could scarcely, in that quantity, cause death on account of its insolubility.

Encephalopathy is the rarest of all diseases caused by lead. Tanquerel met with but seventy cases. It is usually found only in those profoundly saturated with the poison and rarely occurs as a primary affection, commonly being preceded by colic, arthralgia, or paralysis. Tanquerel has found the most important of the prodromes to be violent headache, either general or partial, and often limited to the forehead and accompanied by vertigo. He found, of all trades producing it, that it was least rare among manufacturers of white lead, and after them least rare in painters of buildings. I can find records of only a few cases in the past three decades, after a prolonged search in the library of the College of Physicians, and records of cases of the eclamptic form of encephalopathy seem especially rare, though Tanquerel pronounced them the most frequent cerebral accidents caused by lead.

Dr. Leffmann reports the result of his analyses as

¹ Micro-Chemistry of Poisons, 2d ed., p. 365.

follows: "The examination of the bun shows lead in a small amount, approximately two grains of lead chromate to each bun; but as the material was irregularly distributed, and the portion most distinctly colored was selected for analysis, this estimate is doubtless too high.

"The sponge cake is colored with an organic color soluble in alcohol. This is possibly naphthol yellow, but it has not been definitely identified.

"The samples of urine from Mrs. D. and Katie D. respectively, and various parts of the viscera, give slight precipitates, indicating the presence of some metal of the lead group, but the quantity is too minute to permit of identification, and it cannot, therefore, be affirmed that lead was found in any of these.

"The glaze, very finely powdered, and treated with strong boiling hydrochloric acid, yields a solution which gives with hydrogen sulphide a precipitate which indicates the presence of tin, but this has not yet been fully examined."

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